

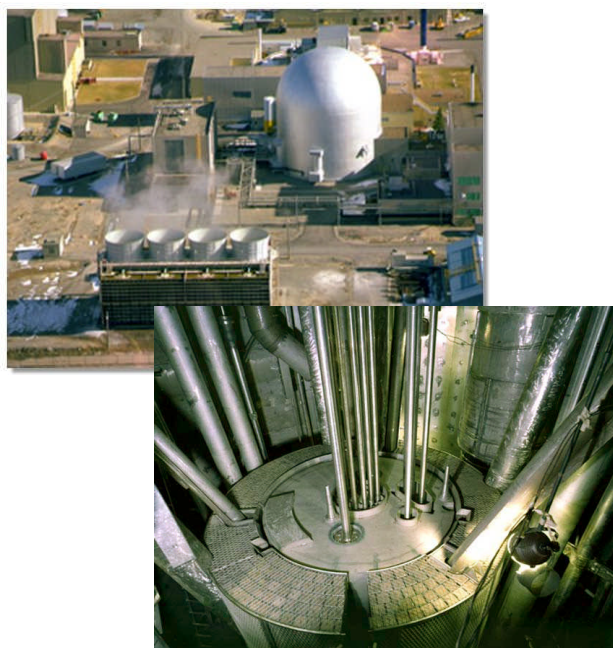
## Experimental Breeder Reactor-II Primary Tank System Wash Water Workshop

### Challenge

In 1994 Congress ordered the shutdown of the Experimental Breeder Reactor-II (EBR-II) and a closure project was initiated. The facility was placed in cold shutdown, engineering began on sodium removal, the sodium was drained in 2001 and the residual sodium chemically passivated to render it less reactive in 2005. Since that time, approximately 700 kg of metallic sodium and 3500 kg of sodium bicarbonate remain in the facility. The RCRA Waste Treatment Permit, issued in 2002 by the State of Idaho Department of Environmental Quality, requires annual progress toward closure of the facility, that all regulated materials be removed or deactivated, and the waste products removed by 2022. The baseline sodium removal technology would result in about 100,000 gallons of low-level waste solution requiring treatment along with separate handling of the large components (intermediate heat exchanger, rotating plug, etc) outside of the primary tank.

### Technical Solution

A workshop was held in February 2008 with a panel of seven sodium cooled reactor cleanup and decommissioning technical experts from the U.S. and the U.K. The workshop reviewed past sodium removal efforts and current EBR-II closure plans, identified and evaluated alternative cleanup methods and recommended a best path forward. Of the six alternatives developed in the workshop the Optimized Baseline Approach (OBA) was favored by the team. The OBA consists of leaving all major components of the primary system in place, and breaching certain components with a penetrating device to allow circulation of steam and wash water throughout. The primary system vessel would be filled with wash water to react and dissolve the residual sodium left in the primary system. This new path forward includes developing the OBA into a well engineered solution for achieving RCRA clean closure of the EBR-II Primary Reactor Tank system and making the cleanup a priority so that adequate funding and a project team could be allocated.



#### Site Project & Identifier

INL EBR-II Wash Water Treatment Technologies  
(PBS # ADSHQTD0100 (0003199))

#### Tech Stage: Pre-Developmental

**EBR-II Wash Water Workshop** - The majority of the sodium has been removed, remaining material is mostly passivated. Similar closure projects have been successfully completed. Engineering needs to be developed to apply the OBA path.

### Tech Accomplishment

The EBR-II Wash Water Workshop developed several alternatives for reducing the cost, waste and personnel exposure for RCRA Closure of the primary tank system. Six alternatives were evaluated and the Optimized Baseline Approach (OBA) was chosen as the preferred alternative. The six alternatives evaluated were: OBA, Baseline, High temperature steam, Grout, Partial filling/steaming and a No Action alternative. In addition to selecting the OBA the team quantified the waste material resulting from this project, developed waste disposition paths, and developed a path-forward for completion of the RCRA closure project. A report detailing the workshop outcome was submitted to DOE-EM in May of 2008.

### Impact

The workshop and report provide a basis to reduce the waste, personnel radiation exposure, schedule and cost of the EBR-II Primary Tank closure. They also provide a path-forward that has been validated by international experts in the field of sodium cooled reactor decommissioning.

### Impact and Features

- The OBA reduces the expected liquid waste generation (probably by over 30,000 gallons) because all of the large reactor components are treated in the primary tank (not separately).
- The OBA reduces the expected schedule for the closure of the primary tank by 2 years (eliminating removal and separate treatment of large components) versus the baseline approach prepared in 2007.
- Radiation exposure is dramatically reduced over the baseline approach, which involved removal and treatment of large, highly radioactive components in unshielded facilities.
- Costs are reduced by an estimated \$7M, based on two year reduction in project schedule (removal of components). Recommendations for better disposition of wastes may add another \$1M savings.

### Vendor/Provider Info:

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### Technology Name

EBR-II Wash Water Workshop:  
analysis of wastes, disposition  
alternatives, alternative evaluation,  
peer group analysis and formal  
report.

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### Web Links:

TBD

Challenge Category	Tech Solution Category
Low Level Waste	Secondary Waste Minimization
Mixed Low Level Waste	Waste Handling
Facility Stabilization	Decontamination
Deactivation	Dismantlement